

IN THE CLAIMS:

1-125. (cancelled)

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126. (original) An electrical power management architecture for managing an electrical power distribution system comprising:

a network;

at least one intelligent electronic device ("IED") coupled with said electrical power distribution system and further coupled with said network, each of said at least one IED operative to implement a power management function in conjunction with a portion of said electrical power distribution system, said power management function operative to respond to at least one power management command and generate power management data, each of said at least one IED comprising:

a first network interface operative to couple said IED with said network and facilitate transmission of said power management data and receipt of said at least one power management command over said network;

said architecture further comprising:

a power management application coupled with said network and operative to receive and process said power management data from said at least one IED and generate said at least one power management command to said at least one IED to implement said power management function, said power management application further comprising a power quality monitoring application.

127. (original) An electrical power management architecture for managing an electrical power distribution system comprising:

a network;

at least one intelligent electronic device ("IED") coupled with said electrical power distribution system and further coupled with said network, each of said at least one IED operative to implement a power management function in conjunction with a portion of said electrical power distribution system, said power management function operative to respond to at least one power management command and generate power management data, each of said at least one IED comprising:

a first network interface operative to couple said IED with said network and facilitate transmission of said power management data and receipt of said at least one power management command over said network;

said architecture further comprising:

5 a power management application coupled with said network and operative to receive and process said power management data from said at least one IED and generate said at least one power management command to said at least one IED to implement said power management function, said power management application further comprising a power reliability monitoring application.

10 128. (original) An electrical power management architecture for managing an electrical power distribution system comprising:

a network;

15 at least one intelligent electronic device ("IED") coupled with said electrical power distribution system and further coupled with said network, each of said at least one IED operative to implement a power management function in conjunction with a portion of said electrical power distribution system, said power management function operative to respond to at least one power management command and generate power management data, each of said at least one IED comprising:

20 a first network interface operative to couple said IED with said network and facilitate transmission of said power management data and receipt of said at least one power management command over said network; and

said architecture further comprising:

25 a power management application coupled with said network and operative to receive and process said power management data from said at least one IED and generate said at least one power management command to said at least one IED to implement said power management function, said power management application further comprising a power outage application.

129. (original) A method of managing an electrical power distribution system, said electrical power distribution system comprising an electrical power management

architecture, said architecture comprising a network, at least one intelligent electronic device ("IED") coupled with a portion of said electrical power distribution system and further coupled with said network, and a power management application coupled with said network, said method comprising:

- 5 (a) implementing a power management function with each of said at least one IED in conjunction with said portion of said electrical power distribution system;
- (b) generating power management data from said power management function;
- (c) securing said power management data from unauthorized access;
- 10 (d) transmitting said secured power management data over said network;
- (e) receiving said secured power management data by said power management application;
- (f) authenticating said secured power management data;
- (g) processing said authenticated power management data;
- 15 (h) generating at least one power management command by said power management application;
- (i) securing said at least one power management command from unauthorized access;
- (i) transmitting said secured at least one power management command
- 20 over said network;
- (j) receiving said secured at least one power management command by at least one of said at least one IED;
- (k) authenticating said secured at least one power management command;
- (l) responding to said authenticated at least one power management
- 25 command to implement said power management function.

130. (new) The electrical power management architecture of Claim 126, wherein said at least one IED further comprises a security module coupled with said first network interface and operative to prevent unauthorized access to said power management data.

131. (new) The electrical power management architecture of Claim 130, wherein said security module is further operative to encrypt power management data generated by said at least one IED onto said network and decrypt at least one power management command received by said at least one IED from said network and wherein said power management application comprises an encryption application operative to encrypt said at least one power management command transmitted onto said network and decrypt said power management data received from said network.

132. (new) The electrical power management architecture of Claim 131, wherein said security module and said encryption application comprises pretty good privacy ("PGP").

133. (new) The electrical power management architecture of Claim 131, wherein said security module and said encryption application comprises prime number based encryption algorithms.

134. (new) The electrical power management architecture of Claim 131, wherein said encryption application comprises elliptical curve based encryption algorithms.

135. (new) The electrical power management architecture of Claim 131, wherein said at least one power management command and said power management data each comprise first and second portions, said first portion associated with a first encryption key and said second portion associated with a second encryption key, and wherein said first key is operative to allow access to said first portion only and said second key is operative to allow access to said second portion only.

136. (new) The electrical power management architecture of Claim 135, wherein said first portion includes said second portion.

137. (new) The electrical power management architecture of Claim 130, wherein said security module is further operative to augment said power management data transmitted onto said network with authentication data and authenticate said at least one power management command received from said network and said power

management application comprises an authentication application operative to augment said at least one power management command transmitted onto said network with authentication data and authenticate said power management data received from said network.

- 5 138. (new) The electrical power management architecture of Claim 130, wherein said power management application is capable of substantially simultaneously receiving power management data from a plurality of said at least one IED.
- 10 139. (new) The electrical power management architecture of Claim 130, wherein said power management application comprises a data collection server coupled with said network and operative to receive said power management data.
140. (new) The electrical power management architecture of Claim 139, wherein said data collection server is operated by a customer of said electrical power distribution system.
- 15 141. (new) The electrical power management architecture of Claim 139, wherein said data collection server is operated by a provider of said electrical power distribution system.
142. (new) The electrical power management architecture of Claim 139, wherein said power management data is transmitted as electronic mail messages, said data collection server further comprising an electronic mail server.
- 20 143. (new) The electrical power management architecture of Claim 142, wherein said data collection server is further operative to receive said electronic mail messages and automatically extract said power management data into a database coupled with said data collection server.
- 25 144. (new) The electrical power management architecture of Claim 139, wherein said power management data is transmitted in hypertext transfer protocol format, said data collection server further comprising a hypertext transfer protocol server.

145. (new) The electrical power management architecture of Claim 139, wherein said power management data is transmitted as data files, said data collection server further comprising a file transfer protocol server.

5 146. (new) The electrical power management architecture of Claim 139, wherein said power management data is transmitted in extensible markup language format, said data collection server further comprising an extensible markup language server.

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147. (new) The electrical power management architecture of Claim 139, wherein said data collection server further comprises a phasor processor.

10 148. (new) The electrical power management architecture of Claim 126, wherein said at least one IED further comprises a revenue meter and said power management application further comprises a peer to peer power management application.

149. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises an electric power generation management application.

15 150. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises a load management application.

151. (new) The electrical power management architecture of Claim 150, wherein said load management application is operative to connect and disconnect loads to/from said electrical power distribution system.

20 152. (new) The electrical power management architecture of Claim 151, wherein said load management application is further operative to disconnect loads during high rate periods and connect loads during low rate periods to reduce electrical power costs.

25 153. (new) The electrical power management architecture of Claim 151, wherein said load management application is further operative to disconnect loads during high demand periods and connect loads during low demand periods to reduce electrical power demand.

154. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises an IED inventory application.

155. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises an IED maintenance application.

5 156. (new) The electrical power management architecture of Claim 126, wherein said electrical power distribution system comprises a utility electrical power distribution network.

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157. (new) The electrical power management architecture of Claim 126, wherein said electrical power distribution system comprises a consumer electrical power distribution network.

10 158. (new) The electrical power management architecture of Claim 126, wherein said network comprises a publicly accessible communications network

159. (new) The electrical power management architecture of Claim 126, wherein said network comprises a Transport Control Protocol/Internet Protocol ("TCP/IP") based network.

15 160. (new) The electrical power management architecture of Claim 159, wherein said network further comprises the Internet.

161. (new) The electrical power management architecture of Claim 159, wherein said network comprises an intranet.

20 162. (new) The electrical power management architecture of Claim 126, wherein said at least one IED comprises an electric (watt-hour) meter.

163. (new) The electrical power management architecture of Claim 126, wherein said at least one IED comprises a revenue meter.

25 164. (new) The electrical power management architecture of Claim 126, wherein said at least one IED comprises an a protection relay.

165. (new) The electrical power management architecture of Claim 126, wherein said at least one IED comprises:

a legacy electric (watt-hour) meter; and

a monitoring and control device coupled with said legacy electric (watt-hour) meter, said monitoring and control device comprising said first network interface.

166. (new) The electrical power management architecture of Claim 126, wherein said at least one IED comprises a phasor transducer.

167. (new) The electrical power management architecture of Claim 126, wherein said electrical power management function comprises monitoring at least one electrical power parameter of said portion of said electrical power distribution system.

168. (new) The electrical power management architecture of Claim 167, wherein said monitoring comprises monitoring by a supplier of said electrical power.

169. (new) The electrical power management architecture of Claim 167, wherein said monitoring comprises monitoring by a consumer of said electrical power.

170. (new) The electrical power management architecture of Claim 167, wherein said electrical power management function further comprises computing revenue.

171. (new) The electrical power management architecture of Claim 170, wherein said electrical power management function further comprises reporting said computed revenue.

172. (new) The electrical power management architecture of Claim 167, wherein said electrical power management function further comprises computing usage.

173. (new) The electrical power management architecture of Claim 172, wherein said electrical power management function further comprises reporting said computed usage.

174. (new) The electrical power management architecture of Claim 126, wherein said power management data comprises power consumption data.

175. (new) The electrical power management architecture of Claim 126, wherein said power management data comprises status data representative of a status of said IED.

176. (new) The electrical power management architecture of Claim 126, wherein said at least one IED further comprises first computer logic including a protocol stack, said protocol stack comprising at least two layers from the group comprising:

an application layer;

a transport layer;

a routing layer;

a switching layer;

an interface layer.

177. (new) The electrical power management architecture of Claim 176, wherein said application layer comprises at least one application, said at least one application being operative to punch through a firewall.

178. (new) The electrical power management architecture of Claim 176, wherein said application layer comprises an electronic mail application and wherein said power management data is transmitted and said at least one power management command are received as at least one electronic mail message.

179. (new) The electrical power management architecture of Claim 178, wherein said protocol stack further comprises a security module, said security module comprising an encryption application operative to encrypt said at least one electronic mail message which comprise power management data prior to said transmission onto said network and to decrypt said at least one electronic mail message which comprise at least one power management command upon receipt from said network.

180. (new) The electrical power management architecture of Claim 179, wherein said at least one electronic mail message each comprise first and second portions, said first portion associated with a first key and said second portion associated with a second key, and wherein said first key is operative to allow access to said first portion only and said second key is operative to allow access to said second portion only.

181. (new) The electrical power management architecture of Claim 180, wherein said first portion includes said second portion.

5 182. (new) The electrical power management architecture of Claim 178, wherein said protocol stack further comprises a security module, said security module comprising an authentication application operative to augment said power management data electronic mail messages with authentication data prior to said transmission onto said network and authenticate said at least one power management command upon receipt from said network.

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18 183. (new) The electrical power management architecture of Claim 182, wherein said authentication application comprises a cellular modem operative to determine a geographic location of said at least one IED, said authentication data including said geographic location.

184. (new) The electrical power management architecture of Claim 178, wherein said authentication data includes a geographic location ID.

15 185. (new) The electrical power management architecture of Claim 176, wherein said application layer comprises an extensible markup language ("XML") application and wherein said power management data is transmitted and said at least one power management command is received in XML format.

20 186. (new) The electrical power management architecture of Claim 176, wherein said application layer comprises a hypertext transfer protocol ("HTTP") application and wherein said power management data is transmitted and said at least one power management command is received in HTTP hypertext markup language format.

25 187. (new) The electrical power management architecture of Claim 176, wherein said application layer comprises a file transfer protocol application and wherein said power management data is transmitted and said at least one power management command is received as at least one data file.

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188. (new) The electrical power management architecture of Claim 176, wherein said application layer comprises an instant messaging protocol application and wherein said power management data is transmitted and said at least one power management command is received as at least one instant message.
- 5 189. (new) The electrical power management architecture of Claim 176, wherein said application layer supports peer to peer communications with at least one other of said at least one IED over said network.
- 10 190. (new) The electrical power management architecture of Claim 176, wherein said protocol stack further comprises simple object access protocol ("SOAP").
191. (new) The electrical power management architecture of Claim 176, wherein said protocol stack further comprises secure sockets layer ("SSL").
192. (new) The electrical power management architecture of Claim 176, wherein said protocol stack further comprises S-HTTP.
- 15 193. (new) The electrical power management architecture of Claim 176, wherein said interface layer further comprises an Ethernet interface.
194. (new) The electrical power management architecture of Claim 176, wherein said interface layer further comprises a dial up modem.
195. (new) The electrical power management architecture of Claim 176, wherein said interface layer further comprises a cellular modem.
- 20 196. (new) The electrical power management architecture of Claim 195, wherein said cellular modem is further operative to provide geographic location information of said IED to said application layer.
197. (new) The electrical power management architecture of Claim 176, wherein said interface layer further comprises a Bluetooth interface.

198. (new) The electrical power management architecture of Claim 176, wherein said interface layer further comprises an AC power line communications interface.

199. (new) The electrical power management architecture of Claim 176, wherein said interface layer further comprises an RF interface.

5 200. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises a centralized power management application.

201. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises a distributed power management application.

202. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises an application program interface to allow at least one power management application to interface with said electrical power management architecture.

15 203. (new) The electrical power management architecture of Claim 126, wherein said power quality monitoring application is operative to monitor for degradation of power quality across said electrical power distribution system.

20 204. (new) The electrical power management architecture of Claim 203, wherein said power quality monitoring application comprises a local power quality monitoring application on a first of said at least one IED and operative to detect degradation on said portion of said electrical power distribution system and report said power degradation to a second of said at least one IED.

25 205. (new) The electrical power management architecture of Claim 204, wherein said second of said at least one IED is downstream of said first of said at least one IED on said electrical distribution system and further wherein said degradation comprises a catastrophic power quality event, said first of said at least one IED operative to warn said second of said at least one IED of said catastrophic event.

206. (new) The electrical power management architecture of Claim 126, wherein said power quality monitoring application is operative to detect a fault in said electrical power distribution system.

5 207. (new) The electrical power management architecture of Claim 126, wherein said power quality monitoring application is operative to correct a fault in said electrical power distribution system.

208. (new) The electrical power management architecture of Claim 126, wherein said power quality monitoring application is operative to locate a fault in said electrical power distribution system.

10 209. (new) The electrical power management architecture of Claim 126, wherein said power quality monitoring application is operative to isolate a fault in said electrical power distribution system.

15 210. (new) The electrical power management architecture of Claim 209, wherein said power quality monitoring application is further operative to control at least one protection relay coupled with said electrical power distribution system.

211. (new) The electrical power management architecture of Claim 126, wherein said power management application further comprises a power distribution system reliability monitoring application.

20 212. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management application further comprises an IED fraud detection application.

213. (new) The method of managing an electrical power distribution system of Claim 129, wherein said at least one IED comprises an electric (watt-hour) meter.

25 214. (new) The method of managing an electrical power distribution system of Claim 129, wherein said at least one IED comprises a revenue meter.

215. (new) The method of managing an electrical power distribution system of Claim 129, wherein said at least one IED comprises a protection relay.

216. (new) The method of managing an electrical power distribution system of Claim 129, wherein said at least one IED comprises

5 a legacy electric (watt-hour) meter; and

a monitoring and control device coupled with said legacy electric (watt-hour) meter, said monitoring and control device comprising said first network interface.

217. (new) The method of managing an electrical power distribution system of Claim 129, wherein said at least one IED comprises a phasor transducer.

10 218. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

(m) monitoring electrical power quality on said portion of said electrical power distribution system.

15 219. (new) The method of managing an electrical power distribution system of Claim 218, wherein said method further comprises:

(n) reporting said power quality events monitored on said portion of said electrical power distribution system.

220. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

20 (m) measuring by said at least one IED at least one phasor parameter of said portion of said electrical power distribution system.

221. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

25 (m) controlling electrical power flow on said portion of said electrical power distribution system.

222. (new) The method of managing an electrical power distribution system of Claim 221, wherein said method further comprises:

(n) controlling electrical generation systems coupled with said portion of said electrical power distribution system.

5 223. (new) The method of managing an electrical power distribution system of Claim 221, wherein said method further comprises:

(n) controlling loading on said portion of said electrical power distribution system.

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224. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management data comprises power consumption data.

10 225. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management data comprises power quality data.

226. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management data comprises status data of said at least one IED.

15 227. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

(m) computing at least one of revenue or cost using tariff/billing data contained within said at least one power management command.

228. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

20 (m) controlling a portion of said electrical power distribution system in response to said at least one power management command.

229. (new) The method of managing an electrical power distribution system of Claim 228, wherein said method further comprises:

25 (m) de-energizing said portion of said electrical power distribution system in response to said at least one power management command.

230. (new) The method of managing an electrical power distribution system of Claim 228, wherein a first of said at least one IED is further coupled with a load, said load being further coupled with said portion of said electrical power distribution system, said method further comprises:

5 (m) at least one of connecting and disconnecting said load from said portion of said electrical power distribution system in response to said at least one power management command.

231. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management application further comprises a centralized power management application.

232. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management application further comprises a distributed power management application.

233. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management application comprises an application program interface to allow at least one power management application to interface with said electrical power management architecture.

234. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

20 (m) receiving said power management data by said power management application, said power management application further comprising a data collection server;

(n) transmitting said power management data as electronic mail messages, said data collection server further comprising an electronic mail server.

235. (new) The method of managing an electrical power distribution system of Claim 129, wherein said method further comprises:

25 (m) receiving said power management data by said power management application, said power management application further comprising a data collection

server coupled with said network;

(n) transmitting said power management data in extensible markup language format, said data collection server further comprising an extensible markup language server.

5 236. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management application comprises an automated meter reading application.

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10 237. (new) The method of managing an electrical power distribution system of Claim 236, wherein said automated meter reading application further comprises a billing management application.

238. (new) The method of managing an electrical power distribution system of Claim 237, wherein said method further comprises:

15 (m) transmitting a command from said billing management application to each of said at least one IED over said network to cause said at least one IED to transmit billing data to said billing management application over said network.

239. (new) The method of managing an electrical power distribution system of Claim 237, wherein said method further comprises:

(m) transmitting billing data by each of said at least one IED to said billing management application.

20 240. (new) The method of managing an electrical power distribution system of Claim 239, wherein said transmitting further comprises:

(n) transmitting billing data by said at least one IED according to a pre-defined schedule.

25 241. (new) The method of managing an electrical power distribution system of Claim 239, wherein said transmitting further comprises:

(n) transmitting billing data by said at least one IED in response to a pre-defined event.

242. (new) The electrical power management architecture of Claim 236, wherein said automated meter reading application further comprises a consumption management application.

5 243. (new) The electrical power management architecture of Claim 242, wherein said electrical power distribution system distributes power generated by a first supplier, said method further comprising:

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(m) switching said electrical power distribution system to distribute power from a second supplier in response to a cost of said power from said first and second suppliers by said consumption management application.

10 244. (new) The electrical power management architecture of Claim 242, wherein said method further comprises:

(m) reducing consumption on said portion of said electrical power distribution system in response to rate changes by said consumption management application.

15 245. (new) The electrical power management architecture of Claim 242, wherein said method further comprises:

(m) monitoring and tracking costs associated with consumption on said electrical power distribution system by said consumption management application.

20 246. (new) The electrical power management architecture of Claim 245, wherein said method further comprises:

(m) monitoring and tracking costs in substantially real time by said consumption management application.

247. (new) The method of managing an electrical power distribution system of Claim 129, wherein said power management data comprises at least one power management command to at least one other of said at least one IED.